Small Business Innovation Research/Small Business Tech Transfer

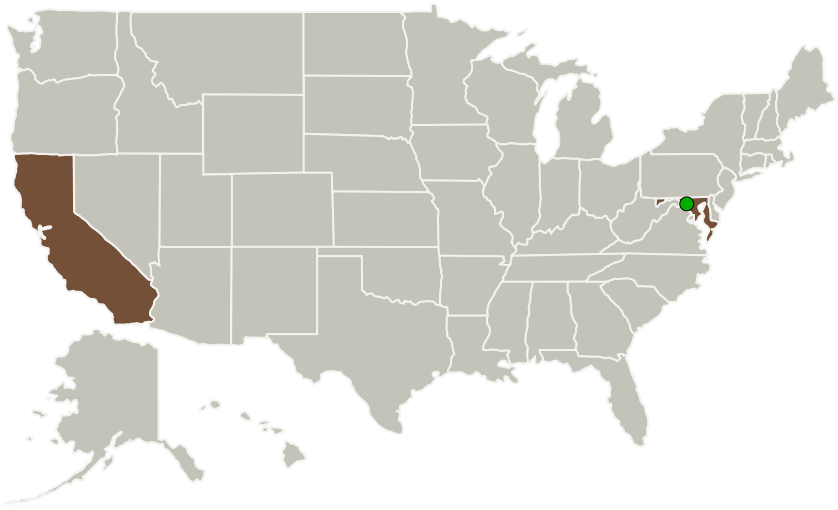
Fabrication Process and Electronics Development for Scaling Segmented MEMS DMs, Phase II

Completed Technology Project (2014 - 2017)

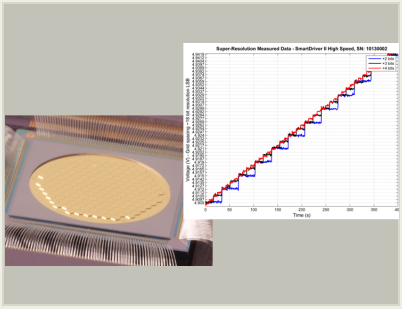
Project Introduction

Microelectromechanical systems (MEMS) technology has the potential to create deformable mirrors (DM) with more than 10^4 actuators that have size, weight, and power specifications that are far lower than conventional piezoelectric and electrostrictive DMs. However, considerable development is necessary to take state-of-the-art MEMS DMs today and make them flight-like. This Phase II SBIR proposal addresses two critical areas in MEMS DM development towards the goal of developing flight-like hardware. Namely, Phase II research will further develop Iris AO's proven hybrid MEMS DM technology to: 1) develop and demonstrate wafer-scale assembly of deformable mirror arrays and 2) increase drive electronics resolution to >=18 bits using hardware-controlled super-resolution oversampling techniques. The increased spatial and actuator resolution afforded by the development here will enable picometer resolution DMs required to reach 10^10 contrast levels necessary for direct detection of Earth-sized terrestrial planets.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Iris AO, Inc.	Lead Organization	Industry	Berkeley, California
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland



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Primary U.S. Work Locations	
California	Maryland

Project Transitions

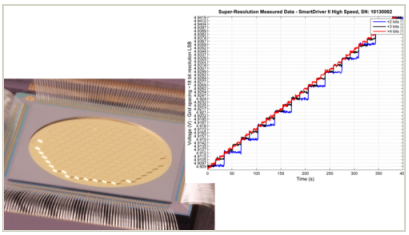
April 2014: Project Start

October 2017: Closed out

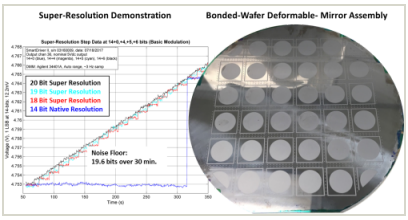
Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137462)*

Images



Briefing Chart Image
Fabrication Process and Electronics Development for Scaling Segmented MEMS DMs, Phase II *(https://techport.nasa.gov/image/130785)*



Final Summary Chart Image
Fabrication Process and Electronics Development for Scaling Segmented MEMS DMs, Phase II Project Image *(https://techport.nasa.gov/image/137020)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Iris AO, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Michael A Helmbrecht

Co-Investigator:
Michael Helmbrecht

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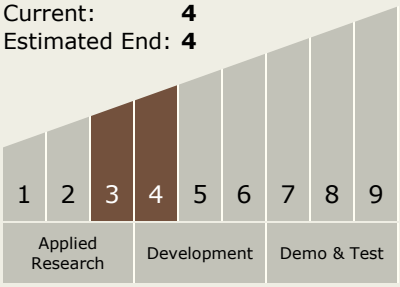
Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX09 Entry, Descent, and Landing
  - TX09.4 Vehicle Systems
    - TX09.4.4 Atmosphere and Surface Characterization

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System